

### IN THE DRAWING

The attached sheet of drawings includes changes to Fig. 3. This sheet replaces the original sheet including Fig. 3.

First, in Fig. 3, reference numerals 35 and 45, showing bidirectional multiplexing/demultiplexing devices, have been added; in particular, the bidirectional multiplexing/demultiplexing device 35 includes multiplexer (MUX) 36 and demultiplexer (DEMUX) 38, and the bidirectional multiplexing/demultiplexing device 45 includes multiplexer (MUX) 46 and demultiplexer (DEMUX) 48.

Second, in Fig. 3, lead lines 87 and 91 have been added; in particular, lead line 87 shows the connection between monitor 86 and reference numerals 70a, 72a, 70b, and 72b, while lead line 91 shows the connection between monitor 90 and reference numerals 80a, 82a, 80b, and 82b.

Attachment: Replacement Sheet

### REMARKS

This application has been reviewed in light of the Office Action dated March 9, 2005. Claims 1-86 are pending in this application, with Claims 5-9, 18-50, 53, and 59-71 having been withdrawn from consideration.<sup>1/</sup> Claims 13, 72, 76, 77, 82, and 84 have been amended to define more clearly what Applicants regard as their invention. Claims 1, 51, 72, 76, 77, 82, and 84, of the claims presently under examination, are in independent form. Favorable reconsideration is requested.

At paragraph 1 of the Office Action, the Examiner withdrew from consideration Claims 5-9, 18-50, 53, and 59-71, as being drawn to a non-elected species. The Office Action states, in part, that Claims 5-9 and 53 recite subject matter that does not appear to read on the elected Fig. 3. Applicants respectfully traverse the withdrawal of Claims 5-9 and 53, for the following reasons.

By way of background, in the Response to Election of Species Requirement filed on November 22, 2004, Applicants elected, without traverse, to proceed with the prosecution of Species I shown at least in Fig. 3, and Applicants identified Claims 1-17, 51-58, and 72-86 as reading on the elected species.

First, although the Office Action states that "Election was made **without** traverse in the reply filed on 11/26/04" (Emphasis in the original), Applicants note that the Election of Species Requirement did not identify any listing of claims which the Examiner believed to read on each species, nor did it state that any claims were withdrawn from

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<sup>1/</sup>Applicants hereby traverse the withdrawal of Claims 5-9 and 53, as explained in more detail below.

consideration. Because Claims 5-9 and 53 were first withdrawn in the present Office Action, it is believed that the present traversal of the withdrawal is proper, and was not forfeited by any lack of traversal made in the Response to Election of Species Requirement.

Second, regarding the traversal, Claims 5-9 and 53 should not have been withdrawn, because these claims read on Fig. 3, which shows the elected species (Species I).<sup>2/</sup> For example, Claim 5 recites a communication network as set forth in Claim 1, wherein the at least one multiplexing/demultiplexing device comprises a plurality of multiplexers (36, 46 of Fig. 3), a first one (36) of the multiplexers having a first input (36a) coupled to a first output (44a) of the external communication node (T), and an output coupled to the fourth terminal (25g, 25h) of the first switch (25), a second one (46) of the multiplexers having a first input (46a) coupled to a second output (54a) of the external communication node (T), and an output (50a) coupled to the fourth terminal (27h, 27g) of the second switch. The at least one multiplexing/demultiplexing device further comprises a plurality of demultiplexers (38, 48), a first one (38) of the demultiplexers having a first input (38c) coupled to the fourth terminal (25h, 25g) of the first switch (25), a first output (38a) coupled to a first input (44b) of the external communication node, and a second output (38b) coupled to a second input (46b) of the second multiplexer (46), a second one (48) of the demultiplexers having a first input (48c) coupled to the fourth terminal (27g, 27h) of the second switch (27), a first output (54c) coupled to a second input (54b) of the

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<sup>2/</sup>It is of course to be understood that the references to various portions of the present application are by way of illustration and example only, and that the claims are not limited by the details shown in the portions referred to.

external communication node (T), and a second output (48b) coupled to a second input (36b) of the first multiplexer (36). Each of the first (36) and second (46) multiplexers couples individual signals received through the first inputs (36a), (46a) and second inputs (36b), (46b) thereof to the output (40a, 50a) of that multiplexer, and each of the first (38) and second (48) demultiplexers couples signals applied to the input thereof (38c, 48c) to corresponding ones of the first and second outputs of that demultiplexer.

As shown above, Claim 5 clearly reads on Fig. 3. Claim 53 recites features that are similar in many respects to those of Claim 5, and reads on Fig. 3 for substantially the same reasons as does Claim 5.

As another example, Claim 6 recites a communication network as set forth in Claim 5, wherein each node further comprises at least one first transponder (44) interposed between both the first multiplexer (36) and the external communication node (T) and between the first demultiplexer (38) and the external communication node (T), the at least one first transponder (44) having a first input (44a) coupled to the first output (L-a) of the external communication node, a second input (44c) coupled to the first output (38a) of the first demultiplexer (38), a first output coupled to the first input (36a) of the first multiplexer (36), and a second output (44b) coupled to the first input (L-b) of the external communication node (T). At least one second transponder (54) is interposed between both the second multiplexer (46) and the external communication node (T) and between the second demultiplexer (48) and the external communication node (T), the at least one second transponder (54) having a first input (54a) coupled to the second output (L-d) of the external communication node (T), a second input (54c) coupled to the first output (48a) of

the second demultiplexer (48), a first output coupled to the first input (46a) of the second multiplexer (46), and a second output (54b) coupled to the second input (L-c) of the external communication node (T).

As another example, Claim 7 recites a communication network as set forth in Claim 6, further comprising a first amplifier (40) interposed between the output (40a) of the first multiplexer (36) and the fourth terminal (25g, 25h) of the first switch (25), a second amplifier (42) interposed between the fourth terminal (25h, 25g) of the first switch (25) and the input (38c) of the first demultiplexer (38), a third amplifier (50) interposed between the output (50a) of the second multiplexer (46) and the fourth terminal (27h, 27g) of the second switch (27), and a fourth amplifier (52) interposed between the fourth terminal (27g, 27h) of the second switch (27) and the input (48c) of the second demultiplexer (48).

As another example, Claim 8 recites a communication network as set forth in Claim 5, further comprising a first variable optical attenuator (71) interposed between the fourth terminal (25h, 25g) of the first switch (25) and the input (38c) of the first demultiplexer (38), and a second variable optical attenuator (81) interposed between the fourth terminal (27g, 27h) of the second switch (27) and the input (48c) of the second demultiplexer (48).

As another example, Claim 9 is directed to a communication network as set forth in Claim 5, wherein the first multiplexer (36) and the first demultiplexer (38) are both included within a first optical line terminal (32), and wherein the second multiplexer (46)

and the second demultiplexer (48) are both included within a second optical line terminal (34).

In view of the foregoing, Claims 6-9 also clearly read on Fig. 3; as do Claims 5 and 53.

Since Claims 5-9 and 53 clearly read on Fig. 3, corresponding to elected Species I, those claims should not have been withdrawn. Furthermore, the Office Action's reference to Fig. 8 in the explanation given for withdrawing Claims 5-9 and 53 is, frankly, not understood. The Office Action dated October 22, 2004, which set forth the election-of-species requirement, defined Species I as "shown in Figure 3". That definition of Species I did not include any reference whatsoever to Fig. 8, and thus it is believed that Fig. 8 is irrelevant to the definition of Species I. For all of the above reasons, Applicants respectfully request Claims 5-9 and 53 to be examined on the merits.

#### CONDITIONAL PETITION TO INVOKE SUPERVISORY AUTHORITY

Should the Examiner refuse to withdraw the withdrawal of Claims 5-9 and 53, this paper should be treated as a petition under 37 C.F.R. § 1.181 to invoke the supervisory authority of the Commissioner and should be forwarded with the file to the appropriate supervisory official for decision. It is believed that no fee is required for the petition, although please charge any fee that may be required to Deposit Account 06-1205.

#### REJECTION UNDER 35 U.S.C. § 101

At paragraph 2 of the Office Action, Claim 84 was rejected to under 35

U.S.C. § 101 as allegedly being directed to non-statutory subject matter for claiming a computer readable program. Without conceding the propriety of this rejection, Claim 84 has been amended to recite a computer readable storage medium storing a program. A computer readable storage medium constitutes statutory subject matter under MPEP § 2106(IV)(B)(1)(a) (page 2100-13). Accordingly, it is respectfully requested that the rejection of Claim 84 under Section 101 be withdrawn.

REJECTIONS UNDER 35 U.S.C. § 112, SECOND PARAGRAPH

Claims 13-17 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. The Office Action states that Claims 13-17 are incomplete for “omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections.” The Office Action in particular states that “[t]he omitted structural cooperative relationships are: a link between the monitor and controller for detecting the occurrence of a failure in at least one of the communication paths.”

The claims have been carefully reviewed and amended as deemed necessary to ensure that they even further conform fully to the requirements of Section 112, second paragraph, with special attention to the points raised in paragraph 5 of the Office Action. Specifically, Claim 13 has been amended to recite that the at least one monitor is coupled to the at least one controller. It is believed that the rejection under Section 112, second paragraph, has been obviated, and its withdrawal is therefore respectfully requested.

### DRAWING OBJECTIONS

At paragraph 6 of the Office Action, the drawings were objected to for not showing every feature specified in the claims. Three reasons were given in support of the objections.

First, the Office Action states that the at least one bidirectionally multiplexing/demultiplexing device must be shown. It is proposed to amend Fig. 3 to add reference numerals 35 and 45 that identify bidirectional multiplexing/demultiplexing devices. In particular, the bidirectional multiplexing/demultiplexing device 35 includes a multiplexer (MUX) 36 and a demultiplexer (DEMUX) 38, and the bidirectional multiplexing/demultiplexing device 45 includes a multiplexer (MUX) 46 and a demultiplexer (DEMUX) 48.

Paragraphs 36 and 37 of the specification have been amended to account for the changes made to Fig. 3. It is submitted that no new matter has been added to the application. For example, support for the at least one multiplexing/demultiplexing device recited in the claims is provided by the specification as originally filed, at, without limitation, paragraphs 14 and 37.

Second, at paragraph 6 of the Office Action, the drawings were objected to for allegedly not showing the entire contents of Claims 5-9. This objection is traversed, because, as described above in association with the traversal of the withdrawal of Claims 5-9, the features of those claims are clearly shown in, e.g., Fig. 3.

Third, at paragraph 6 of the Office Action, the drawings were objected to for



allegedly not showing “a connection between the transmission cables and the monitor.”

Fig. 3 has been amended to show lines 87 and 91 representing respective connections between monitor 86 and links 70a, 72a, 70b, and 72b (in the case of line 87), and between monitor 90 and links 80a, 82a, 80b, and 82b (in the case of line 91).

In view of the foregoing, it is believed that the objections to the drawings have been overcome. Accordingly, Applicants respectfully request withdrawal of the objections to the drawings set forth at paragraph 6 of the Office Action.

REJECTIONS UNDER 35 U.S.C. §§ 102(e) and 103(a)

Claims 1-4, 13-17, 51, 52, 56-58, 72-83, and 85 were rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent 5,986,783 (Sharma et al.). Claims 10-12, 54, 55, and 86 were rejected under 35 U.S.C. § 103(a) as being obvious from Sharma et al.

Claim 1 is directed to a communication network, including a plurality of first communication paths, a plurality of second communication paths, and a plurality of nodes. Adjacent ones of the nodes are coupled together through at least one of the first communication paths and at least one of the second communication paths. Each node comprises a plurality of switches, at least one multiplexing/demultiplexing device, and at least one controller.

The plurality of switches includes a first switch and a second switch, each having a first terminal, a second terminal, a third terminal, and a fourth terminal. The first terminal and the second terminal of the first switch are coupled through at least one of the

first communication paths and at least one of the second communication paths, respectively, to a first, adjacent one of the nodes. The first terminal and the second terminal of the second switch are coupled through at least one other first communication path and at least one other second communication path, respectively, to a second, adjacent one of the nodes. The third terminal of the first switch is coupled to the third terminal of the second switch through at least one third communication path.

The at least one multiplexing/demultiplexing device is bidirectionally coupled to each of an external communication node and the fourth terminal of each first and second switch. The at least one multiplexing/demultiplexing device forwards signals being communicated between the fourth terminals of the first and second switches, and forwards signals being communicated between the external communication node and the fourth terminal of respective ones of the first and second switches.

The at least one controller is coupled to the first and second switches, and is responsive to applied input information for controlling at least one of the first and second switches to cause that at least one switch to selectively couple at least one of (a) the first and second adjacent nodes together by way of at least one of the first and second communication paths coupled to that at least one switch, and (b) the external communication node and at least one of the first and second, adjacent nodes by way of at least one of the first and second communication paths coupled to that at least one switch.

Notably, the communication network of Claim 1 has a plurality of switches, including a first switch and a second switch, each having a first terminal, a second

terminal, a third terminal, and a fourth terminal. For example, Fig. 3 shows a 4x4 optical switch 25 and a 4x4 optical switch 27.<sup>3/</sup>

Sharma et al., as understood by Applicants, relates to techniques for providing normal operation and service restoration capability in the event of a failure of terminal equipment or transmission media in a heterogeneous network, such as a hybrid network containing single- and multi-wavelength lightwave communications systems (see the Abstract).

Fig. 6 of Sharma et al., cited in the Office Action, apparently shows how a hybrid ring network 110 can be retrofitted and upgraded to support multi-wavelength restoration (see column 9, lines 11-13). A representative ring network having add-drop multiplexers (ADMs) 50a, 50b, 50c, and 50d is upgraded so that working fibers 55abw' and 55baw' and protection fibers 55abp' and 55bap' are multi-wavelength capable for bidirectional multi-wavelength communications on the link between ADM 50a and 50b (see column 9, lines 18-24).

Optical switching nodes (OSNs) 120a, 120b, 120c, and 120d of Sharma et al. are interposed between the ADMs and the fiber rings (see column 9, lines 40-44). Each OSN includes optical switch elements and control electronics for controlling the optical switch elements. The control electronics are also responsible for determining when any of

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<sup>3/</sup>Again, it is of course to be understood that the references to various portions of the present application are by way of illustration and example only, and that the claims are not limited by the details shown in the portions referred to.

the optical links from the network has failed and communicating messages to the OSNs in the adjacent nodes. (See column 9, lines 53-58.)

Fig. 7A of Sharma et al., also cited in the Office Action, is a schematic view showing additional details of OSN 120a. The OSN includes west and east network ports, and west and east terminal equipment ports. The figure shows the normal or default switching configuration where no restoration is being undertaken. In this configuration, the OSN acts as a pass-through between the west network ports and the west terminal equipment ports, and between the east network ports and the east terminal equipment ports. (See column 10, lines 30-40.) Figs. 8A and 8B of Sharma et al. show a number of possible switching paths within the OSN.

Fig. 12 of Sharma et al. is a schematic showing a particular implementation of the optical switching portion, referred to as optical switch block 150 (or simply switch block 150), of an OSN according to Sharma et al. (see Column 14, lines 18-21). At column 18, lines 21-27, Sharma et al. states:

From the interconnection map of FIG. 8A or the crosspoint matrix of FIG. 8B, it can be deduced that all the connectivity required in an OSN can be implemented by a small number of switches of 1xN and Nx1 type. In particular, the connections shown can be realized with two 1x3 switch elements, two 1x5 switch elements, two 3x1 switch elements, and two 5x1 switch elements (8 switches).

Therefore, column 18, lines 21-27 of Sharma et al. discusses switches of 1xN type and Nx1 type, in particular 1x3, 1x5, 3x1, and 5x1 switch elements, but does not teach or suggest separate 4x4 optical switches.

At column 14, lines 49-62, Sharma et al. discusses that a general NxN crosspoint matrix switch may be used to implement the required functions of an OSN.

That portion of Sharma et al. states:

While a general NxN crosspoint matrix switch may be used to implement the required functions of an OSN, an implementation such as that shown in FIG. 12 provides significant economies. A full 10x10 switch matrix would require 10 1x10 switch elements and 10 10x1 switch elements. Further, in many switch technologies, 1x3 and 1x5 switch elements are far easier and cheaper to fabricate than 1x10 or 10x1. Thus the preferred implementation of the OSN offers savings in number of switches (8 versus 20) as well as the cost per switch. Even though the specific OSN uses a sparse 10x10 matrix (see FIG. 8B), OSNs for various other network configurations can be designed using the same approach, possibly with a different number of ports or a different desired set of states.

Moreover, at column 17, lines 64-67, Sharma et al. states:

In conclusion it can be seen that the present invention provides powerful and elegant techniques for providing enhanced restoration in optical fiber networks. Full protection of multi-wavelength links in a hybrid network is achieved without having to provide WDM terminal equipment at nodes between single-wavelength links in the network. Desired switching can be effected using relatively simple and inexpensive optical switching nodes, typically using only a small number of nx1 and 1xn switches where n is less than the number of inputs and outputs of the node.

The Office Action, at pages 4 and 5, states that Sharma et al. teaches "...a plurality of switches (reference numeral 120 Figure 7A), including a first switch (e.g. 'West Network Ports' in Figure 7A) and a second switch (e.g. 'East Network Ports' in Figure 7A), each having a first terminal (reference numeral 55aw in Figure 7A), a second

terminal (reference numeral 55adp' in Figure 7A), a third terminal (reference numeral 55dap' in Figure 7A), and a fourth terminal (reference numeral 55adw in Figure 7A)..." However, as described above, Sharma et al. discusses the use of merely a single NxN crosspoint matrix switch, and 1x3, 1x5, 3x1, and 5x1 switch elements.

Nothing has been found, or pointed out, in Sharma et al. that would teach or suggest a plurality of separate switches including a first switch and a second switch, each having the specific configuration and operation as set forth in Claim 1, including a first terminal, a second terminal, a third terminal, and a fourth terminal, that are coupled in the manner recited in the claim. Instead, Sharma et al. refers to a single NxN crosspoint matrix switch, having various 1xN and Nx1 switch elements.

Accordingly, Claim 1 is believed to be patentable over Sharma et al.

Independent Claims 51 recites features similar in many respects to those of Claim 1 relating to plural switches, and also is believed to be patentable over Sharma et al. for substantially the same reasons as those set forth above in connection with Claim 1.

Independent Claims 72, 76, 77, 82, and 84 each recite in part, a plurality of separate NxN switches. For the reasons set forth above, Sharma et al. is not seen to teach or suggest those features. Therefore, those claims are each believed to be patentable over Sharma et al.

The other non-withdrawn claims in this application are each dependent from one or another of the non-withdrawn independent claims discussed above and also are believed to be patentable over Sharma et al. for the same reasons as are those independent claims. Since each dependent claim is also deemed to define an additional aspect of the

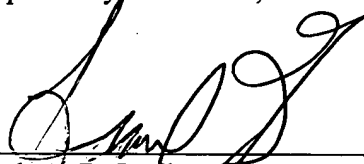
invention, however, the individual reconsideration of the patentability of each on its own merits is respectfully requested.

### CONCLUSION

In view of the foregoing amendments and remarks, Applicants respectfully request favorable reconsideration and early passage to issue of the present application.

Applicants' undersigned attorney may be reached in our New York office by telephone at (212) 218-2100. All correspondence should continue to be directed to our below listed address.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Frank A. DeLucia', is written over a horizontal line.

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